Faculty Working Papers

MORE ON THE EFFECT OF TRADING BY INSTITUTIONS ON STOCK PRICE VOLATILITY

Frank K. Reilly, Professor of Finance, and
John Wachowicz, Assistant Professor of Finance,
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Summary:

This study involves a detailed analysis of the relationship between trading by several groups of financial institutions and numerous measures of stock price volatility. Many observers believe that there is a significant positive relationship between institutional trading and price volatility. In sharp contrast to these beliefs, the results of this study generally indicate a significant negative relationship when the variables are transformed into percent changes.

MORE ON THE EFFECT OF TRADING BY INSTITUTIONS ON STOCK PRICE VOLATILITY*

Frank K. Reilly
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INTRODUCTION

In a previous paper by one of the authors there was an analysis of the relationship between total institutional trading (purchases plus sales) and stock price volatility.[1] The results generally indicated either a very weak positive relationship between these variables or a weak negative relationship. Notably, the results clearly did not support the prevailing belief of many observers that there should be a strong positive relationship between institutional trading and stock price volatility. The reasoning behind such a belief is that institutions trade in large blocks and such a pattern of trading causes a decline in the liquidity of securities markets and, hence, an increase in stock price volatility. The prior study which covered the time period 1964-1974, only considered three measures of stock price volatility, and was limited to analyzing total transactions for all institutions combined. Because of the interest in the relationship and the importance of the results to public policy decisions, this study examines the relationship between institutional trading and stock price

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**The authors are Professor of Finance, University of Illinois at Urbana-Champaign and Assistant Professor of Finance, University of Tennessee.

[1]Frank K. Reilly, "Institutions on Trial: Not Guilty," Journal of Portfolio Management, Vol. 3, No. 2 (Winter, 1977), pp. 5-10.

volatility in much more detail by considering additional stock price volatility measures and much more detailed institutional transactions data. Moreover, additional observations are not available through 1976.

The initial section briefly discusses the prior study on this topic. The following section describes the new institutional trading variables and also several additional measures of stock price volatility. This is followed by a presentation and discussion of the results. The concluding section summarizes the results and discusses some implications for those concerned with the effect of institutional trading on the functioning of the capital markets.

PRIOR STUDY

The purpose of the Reilly study was to examine the relationship among alternative measures of institutional trading and several measures of stock price volatility.[2] Such an analysis is of interest because of a strong belief by some observers that the increase in institutional trading has caused a decline in market liquidity and an increase in stock price volatility.[3] A major problem with a study concerned with analyzing the relationship between institutional trading activity and stock price volatility is the scarcity of data on institutional trading. The institutional

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[2] Ibid.

[3] A small sample of the articles that raise the point includes: "Are the Institutions Wrecking Wall Street?" Business Week (June 2, 1973); Jonathon R. Laing, "Fiduciary Grants: Huge Amounts Managed by Bank Trusts Units Stir Up Controversy," Wall Street Journal (January 7, 1975); Steven C. Leuthold, "The Causes (and Cures?) of Market Volatility," Journal of Portfolio Management, Vol. 2, No. 2 (Winter, 1976); David McClintick, "Illiquid Stocks--Lack of Ready Buyers and Sellers Imperils the Stock Market," Wall Street Journal (December 10, 1971).

trading series employed was entitled, "Common Stock Transactions of Selected Financial Institutions." The financial institutions included are: (1) noninsured private pension funds,[4] (2) open-end investment companies,[5] (3) life insurance companies,[6] and (4) fire and casualty companies. The data are reported quarterly in the SEC Statistical Bulletin[7] beginning in 1964.

In addition to examining the absolute level of purchases and sales, a relative measure of institutional activity was considered. Specifically, a ratio was derived of the purchases plus sales by institutions divided by the total dollar value of stock volume on United States Securities Exchanges[8] during the quarter. The volatility of stock prices was measured using the Standard & Poor's Composite Index of 500 stocks. Three measures of stock price volatility were considered:

1. Percent change in stock prices during the period. Specifically, the percent change from the close on the last day of the period t-1 to the close on the last day of period t.

$$Cl_{(t)} - Cl_{(t-1)}/Cl_{(t-1)}$$

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[4]Includes pension funds of corporations, unions, multiemployer groups, and non-profit organizations; also includes deferred profit sharing funds.

[5]Includes mutual funds reporting to the Investment Company Institute, a group that constitutes about 90% of the assets of all open-end investment companies.

[6]Includes general and separate accounts.

[7]Securities and Exchange Commission, Statistical Bulletin (Washington, D.C.: U.S. Government Printing Office).

[8]This is the total dollar value of round-lot and odd-lot common stock sales by customers and dealers on all U.S. Registered Stock Exchanges. As such it does not include the OTC market. It is reported monthly in the SEC Statistical Bulletin.

2. The absolute value of the percent change in stock prices (i.e., measure #1 without sign).

3. The difference between the high closing price during the period and the low closing price during the period, divided by the low price: (High Price-Low Price)/Low Price.

The correlations among the measures of institutional trading activity and the measures of stock price volatility were analyzed. Those who hypothesize that institutional trading activity contributes toward an increase in stock price volatility would expect significant positive correlations between the alternative measures.

The correlations among the quarterly variables indicated that the relationships among the institutional trading variables and the alternative measures of stock price volatility were generally either positive and statistically insignificant or negative and statistically insignificant. The only exception was the correlation between the percent of institutional trading variable and the hi-lo volatility measure. This correlation of .28 was significant at the .05 level.

The correlations with the annual observations were consistent with the quarterly data results. None of the correlations were statistically significant (with the number of observations the correlations had to be about .50 to be significant). Notably five of the six correlations were negative.

It was concluded that such results did not support the folklore that institutional trading causes an increase in stock price volatility.

CURRENT STUDY DESIGN

Institutional Trading Variables

The prior study considered the combined series, the dollar value of sales plus purchases by a group of financial institutions and also related this combined figure to the total dollar value of trading to derive a relative measure of institutional trading. Because there may be additional information in the components, this combined series is broken down. Specifically, there is an analysis of the effect of only sales by the group of financial institutions on stock price volatility, and subsequently an analysis of only purchases to determine if stock prices react differently to these actions. Some might speculate that the market reacts more to sales than to purchases. Further, because purchases and sales during a specified time period are not equal, it is possible to derive a variable of net purchases (purchases minus sales). The fifth variable is the total dollar value of stock transactions on U.S. Exchanges. This variable is included so that relative measures can be derived for the first four variables, but it is also treated as an independent variable to examine the effect of total trading activity on stock price volatility. Finally, following the relative trading measures there is an activity ratio computed for each of the institutional groups and the total of all the selected institutions. This activity ratio is equal to the mean of the purchases and sales for an institutional group divided by the stock holdings of the institution (this is similar to a trading turnover measure). One might speculate that this activity ratio might have an influence on stock price volatility. Therefore the following trading activity variables are examined:

1. Purchases plus sales (P + S)
2. Purchases (P)
3. Sales (S)
4. Purchases minus sales (P - S)
5. Total dollar value of stock transactions on U.S. Exchange (T)
6. (P + S) ÷ Total $ value of Transactions (T) [(P + S)/T]
7. Purchases ÷ Total $ value of Transactions (P/T)
8. Sales ÷ Total $ value of Transactions (S/T)
9. (P-S) ÷ Total $ value of Transactions [(P - S)/T]
10. Activity Ratio (AR): [((P + S)/2)/Holdings]

Institutional Groups

As noted, the institutional trading series employed in the prior study was the combined figure for four groups of institutions: pension funds; open-end investment companies; life insurance companies; and fire and casualty insurance firms. Again, one may question whether all these institutions trade at the same time and in the same direction. The study by Kraus and Stoll generally indicated that the institutions typically traded at the same time, but not in the same direction.[9] To examine these differences in trading patterns and to determine if alternative institutions have unique effects on stock price volatility, the subsequent analysis considers each of the four individual groups, as well as the figures for the four institutional groups combined.

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[9]Alan Kraus and Hans Stoll, "Parallel Trading by Institutional Investors," Journal of Financial and Quantitative Analysis, Vol. 7, No. 5 (December, 1972) pp. 2107-2130.

Stock Price Volatility Measures

In the prior study there were three measures of stock price volatility--(1) percent change in price from the beginning to the end of the period with sign, (2) percent change in price without sign, and (3) (high price minus low price)/low price. Obviously all of these measures only consider two observations during the quarter. In a study by Reilly and Wright it is shown that the percent change variable may be inadequate because it ignores completely the price changes within the month.[10] To avoid any potential problem, in this study several additional measures of stock price volatility are employed that specifically consider all the daily percent price changes within the quarter.[11] The additional measures of stock price volatility are:

(1) Standard deviation of daily percent price changes during the quarter (SD)

(2) Semistandard deviation of daily percent price changes during the quarter (SSD)

(3) Interquartile range of daily percent price changes during the quarter (IQR)

(4) Mean absolute deviation of daily percent price changes about the mean (MAD 1)

(5) Mean absolute deviation of daily percent price changes about the median (MAD 2)

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[10] Frank K. Reilly and David Wright, "An Analysis of Aggregate Stock Market Liquidity," Paper presented at Eastern Finance Association Meeting, Boston, Mass., April, 1977.

[11] The original three measures of price volatility are retained for comparison purposes.

The standard deviation is a very common measure of dispersion compared to some of the others suggested. The semistandard deviation is considered for those who feel that only deviations below the mean are really relevant in terms of risk.[12] The final three measures are suggested as meaningful measures of dispersion for non-normal distributions. There is a fairly large literature in the area of finance that supports the belief that daily stock price changes are not normally distributed.[13] Given this evidence, it is prudent to consider non-parametric measures of stock price volatility. The interquartile range is a measure of stock price volatility advocated by the SEC.[14] The mean absolute deviation is a measure advocated by Eugene Fama in a supplement prepared for the Bank Administration Institute.[15] The normal way to compute the deviations is from the mean, but because the distribution is probably not normal, the median may be considered a preferable measure of central tendency. Again, for completeness, both measures are considered.

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[12]This measure is discussed and defined in Harry M. Markowitz, Portfolio Selection (New York: John Wiley & Sons, Inc., 1959), Chapter 9; and Jack C. Francis and Stephen H. Archer, Portfolio Analysis (Englewood Cliffs, N. J.: Prentice-Hill, Inc., 1971), pp. 14-16.

[13]Benoit Mandlebrot, "The Variation of Certain Speculative Prices," The Journal of Business, Vol. 36, No. 4 (October, 1963), pp. 394-419; Benoit Mandlebrot, "The Variation of Some Other Speculative Prices," The Journal of Business, Vol. 40, No. 4 (October, 1967), pp. 393-413; and Eugene F. Fama, "The Behavior of Stock Market Prices," The Journal of Business, Vol. 38, No. 1 (January, 1965), pp. 39-105.

[14]It is reported monthly and discussed briefly in the SEC Statistical Bulletin (Washington, D. C., Securities and Exchange Commission).

[15]Bank Administration Institute, Measuring the Performance of Pension Funds (Park Ridge, Illinois, 1968). A Supplement, Risk and Evaluation of Pension Fund Performance was written by Fama.

Levels and Percent Changes

The prior study examined the relationship between the level of institutional trading (either the absolute dollar amount or the relative dollar amount) and the level of stock price volatility as indicated by one of the three measures. Such an analysis can be affected by the existence of strong secular trends in the series. Specifically, it is possible to envision two series that do not move together during individual periods but because they both have strong positive or negative secular trends, the correlations between the two series for some total period will be significantly positive. If such a condition exists it is necessary to attempt to eliminate the trend component from both series and re-examine the relationship.

The figures presented in Table 1 indicate that both sets of data being considered in this study contain strong positive trends. The increase in absolute trading by institutions over the 12 year period ranged from 177 percent for investment companies to almost 700 percent for life insurance companies. This rapid increase in institutional trading likewise is reflected in the relative trading series that also increased (except for the investment company group that basically remained unchanged during the period). This unusual performance by the investment companies relative to the other institutional groups will be discussed further in a subsequent section and provides some very interesting results. For the present the important point is the strong secular growth pattern in institutional trading. The final section indicates that there has likewise been a large increase in all the measures of stock price volatility during this period. Notably, the greatest increases were experienced

by the new measures that are considered to be more relevant because they examine daily price changes.

Therefore, the analysis of the institutional trading series and the stock price volatility series indicates that both sets of series experienced strong secular trends during the period of analysis. Hence, in addition to an analysis of the relationship between levels, it is necessary to transform the data in order to eliminate the trend component. A common technique used in such an instance is to compute percent changes in the series over time. Correlations that related such percent change series would indicate whether changes in the amount or proportion of trading by institutions during a given quarter are related to changes in stock price volatility during that quarter.

PRESENTATION OF RESULTS

The discussion of the results is considered in three subsections. The first subsection contains a discussion of the relationship between the trading activity variables for the various groups of institutions. The second subsection examines the correlations among the alternative stock price volatility measures. The third subsection contains the main analysis of the study--the relationship between the institutional trading variables for the various institutional groups and the alternative measures of stock price volatility.

Relationship Between Trading Activity Variables

This analysis is of interest for two reasons. First, there is a tendency to assume that the institutions trade together which has implications for the affect of institutions on the market. On the one hand

it is desirable for various institutions to be generally active in the market at the same time because they provide liquidity for one another. At the same time, it is not desirable that the alternative institutional groups trade on the same side of the market--i.e., all buy at the same time or all sell at the same time. Such one-sided buying or selling is referred to as "parallel trading" and would probably contribute to major price swings over time. Therefore, it is important to determine whether all institutions are active at the same time, but also attempt to see if their trading is parallel.

The second reason for this analysis is that if all the institutional groups trade together, there is no need for the breakdown--i.e., if they all trade together there is no need to search for a differential affect.

Table 2 contains the correlations between the trading activities for the four institutional groups. In all cases the number designations are as follows:

1. Pension Funds
2. Open-End Investment Companies
3. Life Insurance Companies
4. Property and Casualty Insurance Companies

The combined figure for the four institutions is included but has limited value because it is composed of the other four. The first part of the table indicates the total trading activity of the institutions (purchases plus sales). All the correlations were quite high with the relationship with the open-end investment companies the lowest. Such a close relationship is desirable because it indicates that the various institutions are generally active at the same time buying or selling.

The correlations between purchases are quite similar to the first part. Such a strong relationship is not desirable in this area because it implies purchases at the same time. The correlations between sales activities are generally lower--especially the correlations with the open-end investment companies. This is extremely desirable since it implies less parallel selling by the institutions--i.e., they are not all selling together. The most encouraging results were those relating net purchases. All these correlations were much smaller and those with the open-end investment companies were negative. This would indicate that during the period 1964-1976 the net purchases by the open-end investment companies during specified quarters were contrary to the other institutional groups. This could have happened during some periods when the investment companies had net liquidations and were forced to sell.

The results in Table 3 with relative trading activity were similar except that the correlations with the investment companies were even lower. It appears the investment companies were quite unique during this period in their trading patterns relative to the other institutional groups. In contrast, the strongest correspondence was between the pension funds and the life insurance companies.

Table 4 contains the correlations between the percent changes in the trading activity variables. Overall the correlations were somewhat lower and in this case, the property and casualty insurance companies were the lowest and turned negative regarding net purchases.

The analysis of the relationship of trading activity indicates a strong relationship among the groups on a quarterly basis, but there

are clear indications of unique activity. Notably, these relations over a quarter are quite encouraging when one envisions the possibility of very different actions on a day-to-day basis that is smoothed out over a month or even a quarter. Therefore, any divergence that shows up using quarterly data is probably quite strong on a daily basis.

Relationship Among Price Volatility Measures

The correlations among the stock price volatility measures are contained in Table 5. There are several possible observations. First, there is a very strong relationship among the first five measures whether in levels or percent changes in the measures. This is consistent with some of the prior work relating volatility measures by Altman and Schwartz[16] and by Pinches and Kinney.[17] Notably, the percent change with sign measure has a negative relation to all other variables in terms of levels and very small correlations when examining percent changes in these volatility measures. This is consistent with the Reilly-Wright results discussed earlier and is further support for the contention that this is a poor measure of volatility. The absolute percent change correlations are significant for the levels but very small and insignificant in percent changes. Finally, the results with the high-low measure were not as good as the relationship among the first five, but the correlations were

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[16]Edward I. Altman and Robert A. Schwartz, "Common Stock Price Volatility Measures and Patterns," Journal of Financial and Quantitative Analysis, Vol. 5, No. 1 (January, 1970), pp. 603-625.

[17]George E. Pinches and William R. Kinney, "The Measurement of the Volatility of Common Stock Prices," Journal of Finance, Vol. 26, No. 1, (March, 1971), pp. 119-125.

clearly significant. These results are consistent with the Reilly-Wright findings that this is the best two observation measure of volatility.

Although the five new volatility measures are closely related, they are not strongly correlated to the initial three measures except high-low. Therefore, some of the results in this analysis could differ from the prior study.

Institutional Trading and Price Volatility

The results are contained in a series of 10 tables. Each table contains a ten by eight matrix of correlations (ten measures of trading activity and eight measures of stock price volatility). For each of the five institutional groups (combined plus four subgroups) there are two tables--one with the correlation between levels, while the other contains correlations between percent changes. There is an analysis of percent changes because the levels correlations are biased by the secular trend in the two series as demonstrated by the data in Table 1.

Total Selected Institutions

The results in Table 4 are for the levels of trading and volatility. The results for the top four rows are similar to prior results since they indicate an insignificant positive relationship or an insignificant negative relation.

The results for rows five through eight that consider relative trading are quite different from prior results and indicate the importance of considering relative trading and the usefulness of the new measures of price volatility. Notably, the first three trading measures have a significant positive relationship with the preferred volatility measures.

In contrast, the net purchase series has a significant negative relationship which implies that when institutions are large net buyers, there is lower volatility. Finally, the total transactions variable and activity rate have an insignificant relationship to volatility.

In summary, these results indicate support for the belief that a high proportion of institutional trading is related to an increase in stock price volatility.

The correlations among percent changes in the variables are contained in Table 7. These results are in sharp contrast to the results in the previous table. Specifically, almost all correlations are negative and several in the top three rows are statistically significant--i.e., the absolute trading measures have the stronger negative relationship. These results could be interpreted to mean that during quarters when institutions experienced a large increase in trading activity, whether purchases or sales, that there is a decrease in stock price volatility. The correlations with the relative trading variables were negative but not significant. These consistently negative results are clearly at odds with the prevailing belief that would hypothesize a significant positive relationship. They also indicate that the positive correlations reported in Table 6 were apparently caused by the secular trends in the series.

Pension Funds

The results for the private non-insured pension funds are contained in Tables 8 and 9. These results are important because trading activity by pension funds constituted about half of the total for all selected institutions at the end of the period. The results in Table 8 are quite

similar to those reported for all institutions in Table 6. Again, almost all the correlations are positive, and many with the relative trading variables are statistically significant. The only negative correlations are with the net purchase variables and these are not significant.

Again, when the variables are transformed to percent changes almost all the correlations are negative and many that include the absolute trading variables are significant. Also the correlations with activity rate are negative but insignificant. Again, these results indicate that during quarters when pension funds increase their trading activity, there is a decline in stock price volatility. The results tend to hold for relative trading, but it is not as strong. Also the positive correlations reported in Table 8 appear to be caused by the secular trends in the two series.

Investment Companies

The results for the investment companies are in Tables 10 and 11. These are important because the investment companies are the second largest group (32 percent of total activity) and also because they have consistently had the highest activity rate of all the groups.

These results are notable because even for the analysis with the levels, the great bulk of correlations are negative and several of them with net purchases are significant. The percent change results were consistent with all prior results since almost all the correlations were negative and many between absolute trading variables and the preferred measures of volatility were significant. Also, the correlations with activity rate were negative and almost significant (the minimum required for this number of observations is approximately .275).

Clearly these results do not support the prevailing folklore that institutional trading is related to an increase in stock price volatility. In fact it appears that quite the opposite is true. Apparently the negative correlations for levels and percent changes is because this institutional group did not experience the strong secular trend of the other groups because of the net redemptions noted earlier.

Life Insurance Companies

The life insurance results contained in Tables 12 and 13 are noteworthy because of the significant growth experienced by this group. Although this group is small compared to pension funds and investment companies it has grown about five fold since 1964 and grown from about 8 percent of the institutional total in 1964 to about 13 percent in 1976. Also, the activity rate increased from about 12 percent to nearly 20 percent during this time period.

The results for levels indicate almost all positive correlations and most were statistically significant. Clearly the very strong secular trend made a difference. In contrast, the majority of correlations with percent changes were negative but none of them were statistically significant. Therefore it appears that the levels correlations were due to trend and increases in trading activity were not related to increases in stock price volatility. Put another way, adjusting for trend these results definitely do not support the contention that increases in trading by life insurance companies lead to an increase in stock price volatility.

Property-Liability Insurance Companies

The results for these insurance companies are contained in Tables 14 and 15. These companies account for approximately 8.5 percent of the

total trading by institutions. The results with the levels are interesting because of the large number of significant positive correlations, but also the several significant negative correlations with the net purchase variables. Notably the percent change correlations had a few negative values but the great majority were positive although only five were significant. Even so, this is the only group that provided any support for the folklore. Notably, it is the smallest group in terms of size and the evidence is not strong because most of the correlations with percent change are not significant.

SUMMARY AND CONCLUSION

Summary

This study involved a more detailed analysis of the relationship between trading by large financial institutions and stock price volatility. Such a study is prompted by the increase in institutional trading during the past 12 years both absolutely and relative to total trading. More important, many observers believe that institutional trading causes a decline in liquidity and, therefore, results in an increase in stock price volatility. A prior brief study provided no support for such a belief but the study was limited in the measures of institutional trading and the measures of stock price volatility considered. This study has included a breakdown of the individual institutional groups, a division of transactions, and several additional measures of stock price volatility.

The analysis of the relationship among the trading variables for the four different institutional groups indicated that the groups were generally in the market at the same time in terms of total trading activity (purchases plus sales), but there was a much lower correlation among

purchases or sales--especially with the open-end investment companies. It is obviously preferable for liquidity that various institutional groups are not trading together.

An analysis of the correlations among the several measures of stock price volatility indicated a very strong relationship among the five new measures of volatility and very little relationship with the two-observation percent change measures. The only two-observation measure correlated with the preferable daily measures was the high-low variable.

The relationships between the institutional trading variables and stock price volatility measures were clearly different depending upon the form of the variables. Because both the trading series and the price volatility series had experienced secular increases during the period from 1964 through 1976 the correlations relating the level of the variables could be influenced by the trend components. Therefore, there was also an analysis of percent changes in the two sets of series. The correlations between the level of institutional trading and the level of price volatility were almost always significantly positive. In sharp contrast, almost all the correlations between percent changes were significantly negative. The only exception was the property-liability insurance group which was the smallest of the institutional groups (less than 10 percent). Such results indicate that the level correlations apparently were influenced by the secular trends. After these trends were eliminated the results indicated that when the institutions experience a large increase in trading activity, there is generally a decline in the various measures of stock price volatility.

Conclusion

The results of a more detailed analysis of the relationship between institutional trading and stock price volatility tends to confirm and strengthen the prior study results when the data is transformed to account for the secular trend evident in both series. In contrast to the prevailing belief of many observors that institutional trading causes an increase in stock price volatility, these results indicate that an increase in trading by institutions is related to a decline in price volatility.

Implications

It appears that in a capital market where trading has become dominated by institutions that the best environment is one where all institutions are actively involved because they provide liquidity for one another because they are active, but not necessarily being on the same side of the market. Given such results there is no justification for attempting to restrict or inhibit trading by financial institutions. In fact, such restrictions could lead to an increase in price volatility because the restrictions would, by definition, reduce institutional trading activity and the liquidity available for all market participants.

TABLE 1

TRENDS IN INSTITUTIONAL TRADING
AND STOCK PRICE VOLATILITY
1964-1976

Purchases Plus Sales (P+S) By Institutions ($Mil.)	1964	1976	Percent Change
Pension Funds	6,480(.362)	33,418(.456)	415.71
Investment Companies	8,650(.483)	24,008(.328)	177.55
Life Insurance Co.	1,215(.068)	9,550(.130)	686.01
Prop-Liab Ins. Co.	1,550(.087)	6,282(.086)	305.29
Total Selected Institutions	17,895	73,258	309.38

*Number in parentheses indicates percent of group to total selected institutions

P+S/Total Activity (Ave. of four Quarters)	1964	1976	Percent Change
Pension Funds	.090	.162	80.00
Investment Companies	.119	.116	- 2.52
Life Insurance Co.	.017	.047	176.47
Prop-Liab Ins. Co.	.022	.030	36.36
Total Selected Institutions	.248	.354	42.74

Price Volatility Measures (Ave. of four Quarters)	1964	1976	Percent Change
Standard Deviation	.00328	.00694	111.58
Semi-Standard Deviation	.00242	.00485	100.41
Mean Abs. Dev. from Mean	.00253	.00567	124.11
Mean Abs. Dev. from Median	.00252	.00565	124.21
Interquantile Range	.00432	.01043	141.44
Percent Change with sign	.03075	.04600	49.59
Percent Change w/out sign	.03075	.04600	49.59
High-Low/Low	.04425	.08725	97.18

TABLE 2

CORRELATIONS AMONG TRADING ACTIVITY
VARIABLES FOR ALTERNATIVE INSTITUTIONS

1964-1976(Quarterly)

	(P1+S1)	(P2+S2)	(P3+S3)	(P4+S4)	(P+S)
P1 + S1	----				
P2 + S2	.722	----			
P3 + S3	.960	.611	----		
P4 + S4	.871	.656	.881	----	
P + S	.951	.896	.890	.869	----

	P1	P2	P3	P4	P
P1	----				
P2	.646	----			
P3	.957	.556	----		
P4	.877	.685	.891	----	
P	.943	.856	.894	.909	----

	S1	S2	S3	S4	S
S1	----				
S2	.772	----			
S3	.925	.621	----		
S4	.701	.409	.691	----	
S	.955	.920	.857	.653	----

	(P1-S1)	(P2-S2)	(P3-S3)	(P4-S4)	(P-S)
P1 - S1	----				
P2 - S2	-.185	----			
P3 - S3	.748	-.220	----		
P4 - S4	.573	-.213	.560	----	
P - S	.827	.300	.727	.649	----

TABLE 3

CORRELATIONS AMONG RELATIVE TRADING ACTIVITY
VARIABLES FOR ALTERNATIVE INSTITUTIONS

1964-1976(Quarterly)

	P1+S1/T	P2+S2/T	P3+S3/T	P4+S4/T	P+S/T
P1 + S1/T	----				
P2 + S2/T	.379	----			
P3 + S3/T	.939	.266	----		
P4 + S4/T	.780	.399	.781	----	
P + S/T	.894	.740	.824	.806	----

	P1/T	P2/T	P3/T	P4/T	P/T
P1/T	----				
P2/T	.218	----			
P3/T	.925	.159	----		
P4/T	.807	.483	.810	----	
P/T	.860	.671	.814	.901	----

	S1/T	S2/T	S3/T	S4/T	S/T
S1/T	----				
S2/T	.521	----			
S3/T	.883	.341	----		
S4/T	.584	.108	.543	----	
S/T	.921	.792	.790	.546	----

	P1-S1/T	P2-S2/T	P3-S3/T	P4-S4/T	P-S/T
P1 - S1/T	----				
P2 - S2/T	-.022	----			
P3 - S3/T	.340	-.245	----		
P4 - S4/T	.405	-.241	.309	----	
P - S/T	.704	.518	.395	.508	----

TABLE 4

CORRELATIONS AMONG PERCENT CHANGES IN TRADING ACTIVITY VARIABLES FOR ALTERNATIVE INSTITUTIONS

1964-1976(Quarterly)

	(P1+S1)	(P2+S2)	(P3+S3)	(P4+S4)	(P+S)
P1 + S1	----				
P2 + S2	.835	----			
P3 + S3	.657	.685	----		
P4 + S4	.418	.463	.587	----	
P + S	.924	.961	.782	.573	----

	P1	P2	P3	P4	P
P1	----				
P2	.745	----			
P3	.694	.662	----		
P4	.538	.497	.675	----	
P	.907	.937	.791	.638	----

	S1	S2	S3	S4	S
S1	----				
S2	.773	----			
S3	.441	.511	----		
S4	.242	.197	.394	----	
S	.880	.946	.639	.385	----

	(P1-S1)	(P2-S2)	(P3-S3)	(P4-S4)	(P-S)
P1 - S1	----				
P2 - S2	.277	----			
P3 - S3	.368	.211	----		
P4 - S4	-.203	-.481	-.159	----	
P - S	.708	.226	.448	-.292	----

TABLE 5

CORRELATION AMONG ALTERNATIVE STOCK
PRICE VOLATILITY MEASURES

Quarterly, 1964-1976

A. Levels

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	H-L
SD	----							
SSD	.990	----						
MAD1	.994	.991	----					
MAD2	.994	.991	.999	----				
IQR	.936	.940	.964	.963	----			
%ΔSP	-.336	-.290	-.314	-.316.	-.263	----		
|%ΔSP|	.646	.621	.649	.646	.622	-.028	----	
H-L	.821	.812	.832	.829	.810	-.176	.821	----

B. Percent Changes

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	H-L
SD	----							
SSD	.976	----						
MAD1	.987	.979	----					
MAD2	.989	.976	.999	----				
IQR	.851	.860	.906	.902	----			
%ΔSP	.039	.039	.016	.016	-.100	----		
|%ΔSP|	.055	.014	.016	.016	-.091	.087	----	
H-L	.555	.544	.590	.582	.576	.067	.132	----

TABLE 6

CORRELATIONS BETWEEN TRADING ACTIVITY BY
TOTAL SELECTED INSTITUTIONS
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	.130	.146	.153	.156	.178	.049	-.043	.083
P	.092	.109	.111	.114	.130	.063	-.073	.058
S	.175	.191	.202	.206	.235	.032	-.006	.113
(P-S)	-.182	-.167	-.191	-.190	-.218	-.135	-.251	-.119
(P+S)/T	.375**	.369**	.384**	.386**	.370**	-.054	.155	.288*
P/T	.299*	.294*	.302*	.305*	.278*	-.022	.091	.231
S/T	.455**	.438**	.461**	.463**	.460**	-.088	.219	.341*
(P-S)/T	-.301*	-.298*	-.335*	-.334*	-.401**	.166	-.308*	-.225
T	-.009	.016	.017	.020	.063	.125	-.102	-.030
AR	.037	.043	.035	.036	.020	.117	.006	.094

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 7

CORRELATIONS BETWEEN TRADING ACTIVITY BY
TOTAL SELECTED INSTITUTIONS
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

(PERCENT CHANGES)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.328*	-.266	-.295*	-.297*	-.146	.018	-.175	-.036
P	-.310*	-.248	-.283*	-.285*	-.142	.019	-.178	-.015
S	-.328*	-.270	-.291*	-.292*	-.143	.014	-.158	-.071
(P-S)	-.125	-.074	-.136	-.135	-.117	-.009	-.126	-.077
(P+S)/T	-.109	-.080	-.106	-.102	-.130	-.077	-.069	-.155
P/T	-.145	-.104	-.148	-.145	-.163	-.059	-.112	-.124
S/T	-.054	-.042	-.046	-.043	-.073	-.074	-.016	-.158
(P-S)/T	-.086	-.043	-.105	-.104	-.123	-.007	-.106	-.112
T	-.258	-.214	-.229	-.231	-.091	.040	-.134	.016
AR	-.194	-.140	-.167	-.171	-.038	.049	-.170	.131

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 8

CORRELATIONS BETWEEN TRADING ACTIVITY BY
PRIVATE NON-INSURED PENSION FUNDS
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	.218	.237	.248	.252	.286*	.040	.006	.125
P	.176	.199	.204	.208	.238	.066	-.028	.100
S	.272	.284*	.304*	.308*	.347*	.003	.052	.158
(P-S)	-.056	-.016	-.041	-.037	-.033	.180	-.184	-.039
(P+S)/T	.466**	.465**	.487**	.490**	.498**	-.076	.188	.310*
P/T	.405**	.411**	.423**	.427**	.427**	-.030	.133	.268
S/T	.518**	.510**	.542**	.544**	.560**	-.126	.242	.347*
(P-S)/T	-.164	-.125	-.171	-.168	-.207	.234	-.234	-.116
T	-.009	.016	.017	.020	.063	.125	-.102	-.030
AR	.083	.089	.084	.087	.074	.102	.007	.088

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 9

CORRELATIONS BETWEEN TRADING ACTIVITY BY
PRIVATE NON-INSURED PENSION FUNDS
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

(PERCENT CHANGES)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.340*	-.268	-.323*	-.332*	-.219	.049	-.232	-.137
P	-.297*	-.208	-.276*	-.275*	-.186	.047	-.245	-.102
S	-.367**	-.329*	-.359**	-.359**	-.248	.047	-.184	-.175
(P-S)	-.066	.045	-.050	-.050	-.035	.017	-.198	.034
(P+S)/T	-.104	-.065	-.128	-.122	-.211	.006	-.172	-.298*
P/T	-.068	.006	-.080	-.075	-.172	.016	-.218	-.252
S/T	-.134	-.146	-.169	-.165	-.225	-.005	-.079	-.296*
(P-S)/T	.060	.177	.068	.070	.004	.018	-.196	-.016
T	-.258	-.214	-.229	-.231	-.091	.040	-.134	.016
AR	-.207	-.140	-.199	-.199	-.123	.096	-.243	.006

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

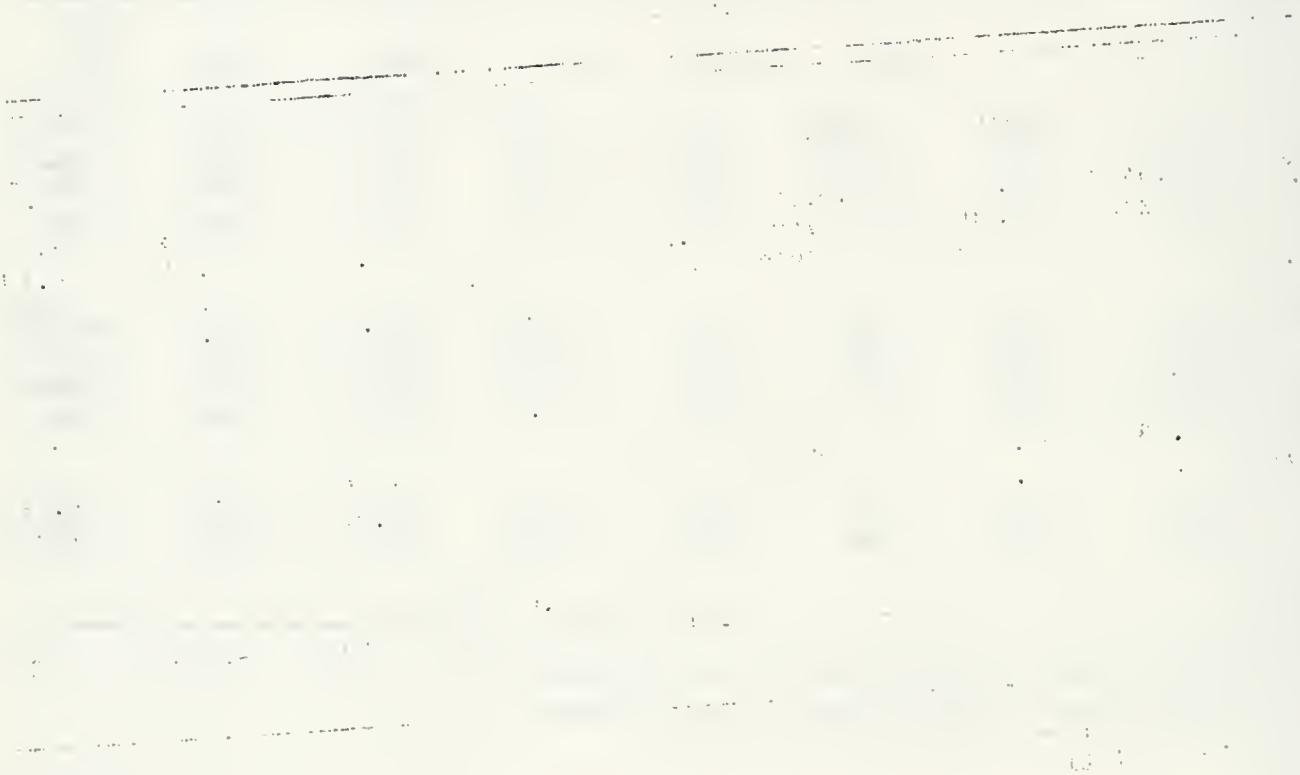

TABLE 10

CORRELATIONS BETWEEN TRADING ACTIVITY BY
OPEN-END INVESTMENT COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.071	-.064	-.066	-.064	-.066	.054	-.155	-.049
P	-.109	-.104	-.109	-.107	-.112	.072	-.151	.054
S	-.030	-.020	-.020	-.018	-.018	-.034	-.154	-.043
(P-S)	-.234	-.248	-.262	-.267	-.278*	.114	.000	-.034
(P+S)/T	.006	-.008	-.012	-.010	-.064	-.002	-.042	.043
P/T	-.073	-.090	-.097	-.097	-.150	.034	-.052	.015
S/T	.088	.078	.078	.081	.029	-.041	-.028	.068
(P-S)/T	-.302*	-.315*	-.331*	-.336*	-.342*	.141	-.048	-.096
T	-.009	.016	.017	.020	.063	.125	-.102	-.030
AR	.033	.044	.034	.036	.024	.143	.018	.109

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 11

CORRELATIONS BETWEEN TRADING ACTIVITY BY
OPEN-END INVESTMENT COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

(PERCENT CHANGES)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.351*	-.305*	-.318*	-.320*	-.162	.022	-.143	-.022
P	-.334*	-.302*	-.305*	-.309*	-.139	.027	-.132	.030
S	-.329*	-.270	-.294*	-.293*	-.168	.016	-.141	-.084
(P-S)	.046	.094	.049	.054	-.057	-.042	-.066	-.024
(P+S)/T	-.228	-.216	-.217	-.214	-.190	-.051	-.034	-.101
P/T	-.263	-.270	-.253	-.255	-.174	-.020	-.040	.020
S/T	-.118	-.094	-.108	-.103	-.136	-.056	-.022	-.172
(P-S)/T	.080	.124	.086	.090	-.008	-.046	.087	.018
T	-.258	-.214	-.229	-.231	-.091	.040	-.134	.016
AR	-.255	-.218	-.224	-.227	-.078	.036	-.122	.111

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 12

CORRELATIONS BETWEEN TRADING ACTIVITY BY
LIFE INSURANCE COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	.284*	.313*	.322*	.325*	.367**	.068	.051	.187
P	.277*	.300*	.310*	.313*	.344*	.054	.041	.189
S	.284*	.320*	.328*	.331*	.394**	.086	.064	.177
(P-S)	.209	.210	.219	.221	.196	-.002	.001	.165
(P+S)/T	.505**	.522**	.537**	.539**	.565**	-.004	.207	.359**
P/T	.506**	.515**	.531**	.533**	.540**	-.028	.202	.366**
S/T	.473**	.501**	.513**	.515**	.568**	.034	.202	.325*
(P-S)/T	.392**	.373**	.390**	.391**	.335*	-.102	.141	.306*
T	-.009	.016	.017	.020	.063	.125	-.102	-.030
AR	.079	.098	.087	.088	.082	.097	-.066	.077

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 13

CORRELATIONS BETWEEN TRADING ACTIVITY BY
LIFE INSURANCE COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

(PERCENT CHANGES)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.123	-.058	-.095	-.094	.019	-.073	-.159	-.085
P	-.101	-.046	-.076	-.071	.024	-.043	-.165	-.042
S	-.151	-.103	-.132	-.135	-.028	-.087	-.116	-.147
(P-S)	-.101	-.088	-.085	-.080	-.012	.012	-.120	-.010
(P+S)/T	.118	.166	.133	.138	.146	-.182	-.068	-.160
P/T	.144	.178	.153	.162	.140	-.124	-.090	-.097
S/T	-.028	.010	-.012	-.015	.039	-.155	-.047	-.180
(P-S)/T	-.038	-.038	-.034	-.027	-.010	.009	-.110	-.016
T	-.258	-.214	-.229	-.231	-.091	.040	-.134	.016
AR	-.020	.038	.003	.004	.098	-.065	-.150	.015

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

TABLE 14

CORRELATIONS BETWEEN TRADING ACTIVITY BY
PROPERTY LIABILITY INSURANCE COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	.374**	.383**	.404**	.406**	.442**	.010	.203	.312*
P	.186	.195	.201	.205	.209	-.041	-.031	.086
S	.566**	.578**	.611**	.610**	.684**	.037	.498**	.572**
(P-S)	-.274*	-.279*	-.296*	-.290*	-.353*	-.088	-.501**	-.414**
(P+S)/T	.571**	.554**	.589**	.588**	.599**	-.140	.412**	.503**
P/T	.334*	.319*	.336*	.339*	.314*	-.133	.100	.197
S/T	.665**	.648**	.692**	.687**	.734**	-.110	.624**	.685**
(P-S)/T	-.318*	-.318*	-.344*	-.336*	-.409**	-.026	-.518**	-.480**
T	-.009	.016	.017	.020	.063	.125	-.102	-.030
AR	.433**	.437**	.457**	.457**	.490**	.088	.342*	.420**

*Correlation is significant at the .05 level.
**Correlation is significant at the .10 level.

TABLE 15

CORRELATIONS BETWEEN TRADING ACTIVITY BY
PROPERTY LIABILITY INSURANCE COMPANIES
AND STOCK MARKET VOLATILITY MEASURES

1964-1976(52 Quarters)

(PERCENT CHANGES)

	SD	SSD	MAD1	MAD2	IQR	%ΔSP	|%ΔSP|	$\frac{H-L}{L}$
(P+S)	-.000	-.026	.044	.040	.211	-.050	.050	.178
P	.029	.065	.043	.046	.137	-.084	.026	.050
S	-.018	-.000	.045	.035	.235	-.004	.039	.248
(P-S)	.085	.063	.070	.067	.059	-.000	-.063	.061
(P+S)/T	.249	.232	.274	.270	.323*	-.122	.222	.200
P/T	.252	.246	.237	.244	.198	-.164	.184	.009
S/T	.173	.159	.225	.215	.332*	-.043	.152	.283*
(P-S)/T	.070	.048	.052	.050	.036	-.003	-.058	.052
T	-.258	-.214	-.229	-.231	-.091	.040	-.134	.016
AR	.108	.121	.146	.139	.284*	-.002	.064	.323*

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.